COMMUNICATIONS REVOLUTIONS:
LITTLE HISTORY, MUCH MYTH

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Any one who has looked even for a moment at the biographical statements we were asked to fill out for this conference might legitimately ask "Why is a medieval legal and ecclesiastical historian the keynote speaker for a conference on the digital age?" That is a fair question and deserves an answer, so allow me to spend a few minutes explaining why I am addressing you and not a specialist in the history of science or technology or, at the very least, a modern historian. The reason is quite simple: I am not any of those kinds of historians. Instead, I bring to the fundamental point of this talk, comparing and contrasting the printing revolution of the fifteenth century and the computer revolution of the twentieth, the perspective of someone whose professional career has been shaped by earlier communications revolutions that have characterized European history. That perspective provides, I trust, some particular insights for those anxious to record the early history of the electronic communications revolution.

From my perspective the communications revolution has been thus far a four-stage movement developing over almost 1500 years.

In the first place, there was the communications revolution of the sixth to the tenth centuries. In this stage, the classical and Christian literary heritage of the Roman world was copied onto parchment by monks anxious to preserve the ancient learning that was threatened with extinction because it was written on papyrus, a product admirably suited for the written word in warm, dry Egypt but which decayed rapidly in the cold and wet lands north of the Mediterranean. This not only served to retain this ancient knowledge, but to spread it as well, first as monasteries sought to expand their libraries by obtaining copies of manuscripts found elsewhere. Subsequently, in the eleventh and twelfth centuries, the establishment of cathedral schools and then universities meant that this preserved knowledge would be available throughout the literate European world. The copyroom where Brother Francis labored in A Canticle for Leibowitz provides a realistic picture of an early medieval scriptorium and the market it served.

The second stage of this revolution occurred with the appearance of the printing press in the mid-fifteenth century. As we shall see, this stage had much in common with what preceded it.

The next great leap in communications technology came in the nineteenth century with the invention of devices to send messages over wires. The telegraph, now virtually defunct, and then the telephone enabled people to communicate with one another over vast spaces. Radio and television were twentieth-century continuations of the electrical communications stage of development.

The final stage in this development, although most likely only the most recent stage, is the computer-based digital communications revolution of our own day.

My own research is closely connected to and greatly affected by the transformation from handwritten manuscripts to the printed page. In the first place, the early printers produced works for which there already existed a market. In the case of the field in which I work, a large number of manuscripts from the earliest stage of the development of the canon law, the law of the medieval church, remained unpublished because they had been superseded by later developments.

Fifteenth-century lawyers wanted the more up- to-date commentaries on the law, not the earliest ones. There was no market for the foundational records. Many of these early writings have never been published and remain available only in manuscript form, yet in order to understand the early development of the legal system of which they are a fundamental part, these documents are of vital importance. In the second place, even the published works, the later legal writings, appear only in editions that are often, by twentieth-century standards, poor because they were based only on whatever manuscripts happened to be available to the printer at that moment. There was little attempt at creating a scholarly accurate text, one free of copyists' errors and so on. Admittedly this would have been difficult as there was no index of manuscripts, no central archive that contained a list of where they might be located. Furthermore, adding to the difficulties that scholars would later face, once a text had been set in type, the parchment page could be thrown away because after all we have the printed version don't we?

What I have just described here, from the perspective of someone in the late twentieth century who has to deal with it, is one of the basic problems in the history of technology, the loss of information that occurs when a new technology is introduced and supersedes an older one. At this point we have come to the main theme of my talk, some comparisons and contrasts between the printing revolution and the digital revolution and some suggestions for those involved in recording the history of the latter.

In keeping with a basic premise of all teaching, let us begin with a statement of what we might call the basic understanding of the printing revolution, a starting point from which we can all proceed, the 'common knowledge' pf this revolution that we all share. Around 1450, Johann Gutenberg invented the printing press. The consequences of this invention were extraordinary as the history of the next 150 years demonstrated. In the first place, literacy increased throughout Europe. The greater availability of books meant the beginning of the end of the Catholic Church's control of the intellectual life of Europe, a movement that culminated in the Protestant Reformation and the scientific revolution. Information now flowed across national boundaries undercutting the powers of absolute monarchs as well, paving the way for the modern democratic, constitutional state, and, in general, creating what we term the modern world. Furthermore, this international flow of written materials contributed to a sense of belonging to a Europe-wide society instead of a limited national kingdom.

The interesting point of these statements of 'common knowledge' is that none of them is completely accurate and some are quite wrong. We could even call it a collection of 'common misunderstandings' that we all share. In the first place, it is clear that Gutenberg was only one of several individuals who were experimenting with printing. There was a widespread interest in producing books by technological means rather than by hand. In the second place, the crucial invention was not the press but moveable type. The printing press, using wood blocks to print playing cards, devotional pictures, and the like had been available since the early fifteenth century. Indeed, without a series of earlier developments, the press, paper, even the alphabet which required fewer than 100 items, including upper and lower case letters, punctuation marks, and numbers Gutenberg's invention would have been of little significance. The subsequent development of printing in turn depended upon other improvements such as those in metallurgy that to the discovery of the proper mix of lead, tin, and antinomy to be used in the casting of type. What was important was the bringing together of several developments, the synthesizing so to speak of several technologies in order to achieve the final product, and then subsequent refinement of the result. The pressure to meet the needs of the market then encouraged improvements that would lengthen the working life of the type.

Granted that the technology of printing was the result of an evolutionary process, surely the sociological consequences were enormous. For example, literacy must have become of more use with the appearance of books. In fact, it was largely the other way round, the development of printing owing more to the increasingly literate populations of urban Europe, the Rhineland, the Netherlands, and Italy than is generally recognized. The market demand for the written word pushed the development of printing rather than the reverse.

What about the Reformation? Was it not sparked by the publication of Martin Luther's 95 Theses throughout Germany within weeks after he posted the handwritten original on the door of the university church in Wittenburg? To the limited extent that this statement is true, the setting of Luther's words in type was of marginal significance. Handwritten copies could have had the same effect. The same is true of the other consequences attributed to the invention of printing. It was not after all only the Protestants who employed the printing press to advocate their views. The Catholic Church did the same thing. Furthermore, it is important to realize that the Protestant leadership was no happier with the members of the lower classes airing their theological and political opinions in public than the Catholic.

Did governments fear printing? The answer is perhaps, but, like the religious leadership, secular rulers sought to use it for their own end. While it is true that critics of governments could now reach a larger audience, so too could governments. One consequence of printing was the standardization of language. Printers could not afford to print materials in each of the dialects found within every European kingdom. One consequence was the decline and even disappearance of those dialects that could not justify the costs of printing. Another was the way in which rulers insisted on publishing official documents in what we would now term the official national language thus requiring all their subjects to use that dialect. The appearance of a grammar of the Castilian language in the 1490s and the creation of the French Academy by Louis XIII to standardize the French language in 1635 are fundamental dates in the process of creating national languages. Latin, the international language of learning in the Middle Ages, gradually declined as the vernacular languages of Europe in their standardized versions rose. The use of the printing press, to the extent that it contributed to the development and spread of national languages reduced a sense of internationalism and even strengthened the hands of rulers who understood how to use language to their own advantage.

What we have considered in this discussion is what we might call the mythology of the printing revolution, that is the history of printing as we would like it to have been. In the first place, we like the heroic image of the lone inventor who creates something new and different that then has extraordinary consequences. In the second place, we are inclined to see the consequences of an invention as making a quick, sharp break with the past. The slow, sometimes zigzagging process of change is not aesthetically appealing.

Finally, and most important, we are inclined to see all the significant events that followed the invention of printing as a consequence of that invention. This is in fact one of the oldest of logical fallacies, that of post hoc ergo propter hoc, that is, if event B follows event A then B was caused by A. A classic statement of this fallacy that those of us of a certain age might remember occurred in the opening moments of the old television program, Rhoda. In a voiceover, Rhoda is heard to say that she was born in the summer of 1941. The Japanese attacked Pearl Harbor in December. My mother always thought there was a connection. As far back as the late sixteenth century Francis Bacon was identifying printing as one of the crucial discoveries that created the modern world, but that does not make it necessarily so. In reality, Bacon and others who made this claim were doing so on ideological grounds rather than on historical ones.

The history of the development of printing is thus filled with gaps, voids, and unverifiable conclusions and has been so for a very long time. As early as 1520 there were those who were seeking to determine the facts of the development of printing;

they were unsuccessful. The mists of time had already enfolded the story.

What does this tale of myth and history have to tell those interested in the development of the digital revolution? While carefully avoiding that other popular mythology that begins: history teaches ....", let me make a couple of suggestions. The first thing to do is to place the digital revolution within the context of the communications and technological developments of the twentieth century. The laptop on which I wrote this paper is after all the product of several important developments, not just one.

The second point is to avoid the 'great inventor' approach. This is not to denigrate the work of any individual, only to remind you that the great inventions are the result of process and synthesis, not lonely individuals working in attics or garages isolated from the wider world.

A third point is to avoid seeing the history of the digital revolution as a single straight, ever-rising line. It is one of the conceits of poor history of science and technology to see this history as the continuing victory of reason, common sense, and other virtues over the dark, not to say evil, past, moving from mankind from the valley of shadows to the sunny high plains of the modern world. This approach tends to neglect the dead ends, the failures, the ill-conceived projects, that litter the history of all aspects of human history. Some of these dead ends and failures, however, have seeds that subsequently sprout when new information or technology becomes available. Awareness of these aspects of the digital revolution is especially important because the span of time that constitutes a generation in this area is brief, as little as six months. The scrapheap may well contain ideas and materials that, with a bit more development, could make a significant contribution to the field or, when placed in a new context, play a role not conceived of by their inventors.

A fourth consideration should be "what has been lost" as we move from one technology and mode of communication to another? When parchment replaced papyrus, a certain number of Latin texts were lost because they were not copied onto the new material or because only one or two copies were made and they were destroyed in the course of time. Later, as I pointed out, the use of the printing press led to the loss of manuscripts as printed versions appeared. Not only were the original texts lost, marginal notes that provided commentaries on the text were also lost, thus leaving us in the dark about how medieval readers understood the materials.

Something similar to these losses occur as modern texts move to the electronic world. For example, the authors of scholarly articles that are placed in electronic data bases are asked to provide key words so that other researchers can quickly locate and use them. A useful idea and it certainly will speed up data searches. The drawback is that the reader of an article may actually find a significant point that did not appear so important to the author who therefore never provided a key word to guide the searcher to the article. Both cases eliminate the serendipities that came with the earlier systems.

Another form of loss occurs when library catalogs are converted to digital form. Recently, while using the old card catalog at the University of Pennsylvania Library (because the computerized catalog was down), I was talking with one of the librarians who happened to be doing the same thing. He pointed out that when the cards were converted to a digital record, not all of the data on the cards was entered. This was especially true of the very old cards that often had extensive cataloguing information handwritten on them. Because the Penn Library has extensive holdings in the history of the Near East and Egypt, these old cards often have notes written in Arabic, Greek, and other languages that the computer program for the catalog did not accept, this data has not been entered in the new catalog. The result that this very detailed information will be lost to future generations of scholars. At the very least, users of the new technologies ought to be made aware that the older technologies often contain valuable information not found in the computer.

In the category of what has been lost, there are also the early devices, not simply the vacuum-tube monster machines of forty years ago, but the Ataris and Commodores and the operating systems, especially the proprietary ones, that ran them have been largely lost. As the invention of printing led to the standardization of languages meant the end of the dialects and languages that did not attain printed form, so the emergence of standard operating systems and the dominance of particular programs for word processing, bookkeeping, and so on meant the end of operating systems and programs that had achieved only limited market share. Nevertheless, there remains both technical knowledge and information in these machines and on these systems that may yet prove useful.

Let me conclude with a kind of cautionary tale. The questions this conference will be asking about the digital revolution have all been asked before. That is obvious. What is of special interest is that by 1520, two generations after the printing press appeared on the scene, Europeans were asking about where it came from, how it was developed, and what were its consequences. Even at that seemingly early date, the origins of printing were lost in the mists of time. Given the short length of a generation in the digital world, this conference is not being held any too soon. If the historical record is not prepared, then the story of the digital revolution will be sealed off from later generations as tightly as the fallout shelter that held the records of the Blessed Leibowitz and be as accurate as Brother Francis's elegant reproduction of the blueprint he discovered.